AAC 01
Australian Algebra Conference

27–29 November 2017
University of Technology Sydney

With financial support from the Australian Mathematical Society, via the *Australian Algebra Group*, the School of Mathematical and Physical Sciences, University of Technology Sydney and CARMA, University of Newcastle.

welcome

Welcome to the inaugural Australian Algebra Conference at UTS!

The main aim of the meeting is to foster communication between algebraists in Australia. We interpret algebra broadly, including areas such as topological algebra, algebraic logic, graph theory and coding theory.

The Australian Algebra Conference began life in Victoria. The zeroth Victorian Algebra Conference, at La Trobe University in 1982, was actually a workshop on lattice theory and universal algebra, which was organised by Brian Davey because he had two international visitors, Heinrich Werner (Kassel) and Hilary Priestley (Oxford). This workshop brought together Australian algebraists from a wide range of areas, and its success led Gordon Preston to suggest “We should do this every year". The Algebra Conference of Victoria (ACV), later the Victorian Algebra Conference (VAC) and now the Australian Algebra Conference (AAC) has been held every year since. The final VAC was held in 2016 at La Trobe University.

The AAC has a proud tradition of encouraging talks by students: typically about one third of the talks are presented by students, which is certainly true this year with 12 of the 30 contributed talks by students. The conference aims to provide students in algebra with the opportunity to give their first public presentation in a relaxed and supportive environment. Each conference, the most outstanding student talk is awarded the Gordon Preston Prize.

This year we are particularly excited to have three international keynote speakers: Astrid An Huef (New Zealand), Anthony Bak (Germany) and Intan Muchtadi-Alamsyah (Indonesia). We are also extremely proud to hold the event at the University of Technology Sydney. We hope you enjoy spending time on the campus, which you can see is in a rapid growth stage with building 2 taking shape in front of us.

The event is extremely grateful for financial support from the School of Mathematical and Physical Sciences at UTS, the priority research centre for Computer-Assisted Mathematics and its Applications (CARMA) at the University of Newcastle, and the Australian Algebra Group via the Australian Mathematical Society.

Australian
Algebra
Group

information

talks and catering

Please check the schedule at the end of this booklet. Most talks will be in rooms 401 and 405, level 00 building 11. Morning and afternoon teas will be in the area outside these rooms. On Wednesday we have a parallel session in building 4, level 05, room 430 with a light lunch provided for all participants next to this location after the last talks.

internet

There is wireless internet throughout the campus, which you should be able to use if you have access to *eduroam*.

lunch

UTS has several on-campus eating options, of which we recommend Cornerstone Cafe (building 7) and Penny Lane (building 11), but we actively encourage participants to walk a few extra steps to either the edge of Chinatown (around Quay St), or Broadway, or Spice Alley (see the map) for some really great options. On Monday we have an hour and a half for lunch to give you time to explore. *Spice Alley* is close to UTS on the other side of Broadway. It is like a fake version of street food, but really pretty nice.

coffee

We are not in Melbourne anymore former VAC participants. Try

1. The caffeine project, Central Park
2. Something for jess, Abercrombie St
3. Toby's Estate Coffee Roasters
4. Many others around Quay St Chinatown, Glebe, Redfern.
5. On campus: Cornerstone (Building 7), Penny Lane (Building 11)

getting around

By now you probably already have an Opal Card. Purchase from 7-11 stores or the train station at the domestic and international airport terminals (not at other train trains) and top-up if required from these places or online. On Sundays in NSW you can use Opal to go anywhere, on ferries, trains and busses, capped at $2.60 for the whole day. For tourism a nice journey is to walk from UTS to Darling Harbour, then take a ferry (with the Opal Card) from there around to Circular Quay, then walk to the Opera house etc.

questions?

Feel free to ask Murray, Michal, Andrew or any of the other locals if you need assistance during the conference.

conference dinner

The conference dinner is on Tuesday, 7:30pm, at *Bohdi*, Cook and Philip Park, CBD. The venue is outdoors under some beautiful Moreton Bay Figs, so if you feel the cold bring a warm jacket. Hopefully the weather is good to us.

entrée: edamame beans with sea salt; mixed steam baskets of shitake mushroom and asparagus dumplings; green tea choy sum dumplings; sweet Japanese pumpkin dumplings; sweet potato and yam rolls in rice noodle pastry net; salt and pepper tempura 'prawns'

mains: stir fried chilli bean eggplant, zucchini and tofu with pumpkin puree; bodhi vegetarian peking 'duck', bbq sauce, cucumber and pancakes; wok tossed medley of mushroom, asparagus, soft tofu and cashew nuts, with creamy coconut; lemongrass sauce in a pastry nest; shin marinated and grilled australian field mushrooms, with daikon and nori rosti, with house made kimchee and sesame

sides: white or brown rice; tossed asian greens, lemon grass, kaffir lime leaves and pickled mustard

dessert: selection of mini ice cream

To get to the restaurant from UTS, it is possible to take a bus but most effective to walk. The resturant is in Cook and Philip park (right next to Hyde park) where you will find Cook and Philip swimming pool, St Mary's cathedral, the Australia Museum, so if you arrive early you could take a look at these attractions or just enjoy the park.

participants

current as of 27 November 2017

Zahra Asfar	University of Wollongong
Farad Alamrani	University of Canberra
Brian Alspach	University of Newcastle
Astrid An Huef	Victoria University of Wellington
Dickson Annor	The University of Sydney
Becky Armstrong	The University of Sydney
Anthony Bak	Bielefeld University, Germany
Alex Bishop	University of Newcastle
Kevin Aguyar Brix	University of Copenhagen
Nathan Brownlowe	The University of Sydney
Timothy Bywaters	University of Sydney
Alex Casella	University of Sydney
Brian Davey	La Trobe University
Tony Dooley	University of Technology Sydney
James East	Western Sydney University
Murray Elder	University of Technology Sydney
Michal Ferov	University of Technology Sydney
Sasha Fish	University of Sydney
Barry Gardner	University of Tasmania
Volker Gebhardt	Western Sydney University
Young Kuan Goh	University of Technology Sydney
Lucy Ham	La Trobe University
Nick Ham	University of Tasmania
Eli Hazel	La Trobe University
Roozbeh Hazrat	Western Sydney University
Michael Hendriksen	Western Sydney University
Marcel Jackson	La Trobe University
Hafiz Khusyairi	Australian National University
Tim Koussas	La Trobe University
Huanhuan Li	Western Sydney University
Yinan Li	University of Technology Sydney
Michael Mampusti	University of Wollongong
Intan Muchtadi-Alamsyah	Institut Teknologi Bandung
Alexander Mundey	University of Wollongong
Adeyemi Olusegun Olaiju	Universiti Teknologi Malaysia
Raimund Preusser	University of Brasilia
Youming Qiao	University of Technology Sydney

Iain Raeburn	Victoria University of Wellington
Tapan Rai	University of Technology Sydney
Krish Ramanathan	Sydney Institute of Business and Technology
Colin Reid	University of Newcastle
Subhrajyoti Saha	Monash Univeristy
Aidan Sims	University of Wollongong
Jason Stanley	University of Technology Sydney
Dominic Tate	University of Sydney
Chris Taylor	La Trobe University
Don Taylor	University of Sydney
Lauren Thornton	University of the Sunshine Coast
Iknur Tulunay	University of Technology Sydney
Mike Whittaker	University of Glasgow
Binzhou Xia	University of Melbourne
Kai Siong Yow	Monash University

keynote talks

1. Amenability of quasi-lattice ordered groups

Astrid An Huef (Victoria University of Wellington, New Zealand)

Let G be a discrete group with a generating submonoid P such that $P \cap P^{-1} = \{e\}$. There is a partial order on G defined by $x \leq y$ if and only if $x^{-1}y \in P$. The pair (G, P) is quasi-lattice ordered if all $x, y \in G$ with a common upper bound in P have a least upper bound in P.

Quasi-lattice ordered groups and their Toeplitz algebras were introduced by Nica in 1992. A quasi-lattice ordered group is amenable if the concrete Toeplitz algebra, which is a subalgebra of the bounded linear operators on $l^2(P)$, is isomorphic to the C^*-algebra universal for certain representations of (G, P). For example, the Baumslag-Solitar group

$$G = \langle a, b : ab^c = b^d a \rangle$$

with submonoid P generated by a and b is an amenable quasi-lattice ordered group. Motivated by what happens for the Baumslag-Solitar group, I will discuss two sufficient conditions for amenability of a quasi-lattice ordered group.

2. The classification of subgroups of a group which are invariant under the action by conjugation of a fixed subgroup

Anthony Bak (University of Bielefeld and ISOPP, Germany)

In 1830, Galois invented at the age of 19 the concepts of group, normal subgroup and solvable group. He did this order to prove his famous result that the roots of a polynomial with coefficients in a field can be obtained by adjoining roots of unity to the ground field if and only if the Galois group of the polynomial is a solvable group. Ever since then the topic group theory has to a major extent revolved around when a subgroup H of a group G is normalized by another subgroup K (a generalization of the concept of normal subgroup) and the use of the group $[H, K]$ of mixed commutators of H and K (which Galois used in formulating the notion of solvability). This talk uses mixed commutators to describe the set of all subgroups of a group G which are normalized by a fixed subgroup K of G. The description is simple and is called a sandwich classification, because of the way it is formulated. We then give a historical account of the development of sandwich classifiction in group theory, beginning with results of C. Jordan in 1870 classifying the normal subgroups of the general linear group $GL_n(F_p)$ of the prime field F_p where p is a prime number. We close with some open problems related to our sandwich classification results.

3. Stability of Gorenstein graded flat modules

Intan Muchtadi-Alamsyah (Institut Teknologi Bandung)

In this talk, we introduce second degree Gorenstein gr-flat modules and we show that the two-degree Gorenstein gr-flat modules are nothing more than that the Gorenstein gr-flat modules over a GF-gr-closed ring.

contributed talks

1. On (1,2)-invariant graphs

Brian Alspach (University of Newcastle)

A trivalent vertex-transitive graph X is (1,2)-invariant if its edge set can be partitioned into a 2-factor and a 1-factor so that Aut(X) preserves the partition. This talk is concerned what we have determined so far about this family of graphs.

2. Simple graph algebras

Becky Armstrong (The University of Sydney)

Since their introduction twenty years ago, C^*-algebras associated to directed graphs have become a popular tool for investigating various classes of C^*-algebras, because analytical properties of these C^*-algebras depend on much simpler combinatorial properties of the underlying graphs. One such analytical property is simplicity, which plays a fundamental role in the classification program for C^*-algebras. In this talk I will first recall the characterisation of simplicity for directed graph C^*-algebras. I will then describe the results of my PhD research, in which I characterise simplicity of twisted C^*-algebras of topological higher-rank graphs in terms of the underlying graphical and cohomological data. (This is joint work with my PhD supervisors, Nathan Brownlowe and Aidan Sims.)

3. Geodesic Growth of the Fabrykowski-Gupta Group

Alex Bishop (University of Newcastle)

An open question in geometric group theory is whether there exists a group with intermediate geodesic growth. That is, a group for which the function which counts the number of length n geodesics (i.e. minimal length word representations of group elements) grows faster than any polynomial and slower than any exponential; a potential example for this property is the Fabrykowski-Gupta group.

This presentation will introduce an efficient algorithm for computing the geodesics of the Fabrykowski-Gupta group with the objective being to provide a computation-based experimental method for studying the geodesic growth of this and similar examples. The complexity of this algorithm will be given and it will be shown to be a massive improvement over the complexity of the previously known brute-force method which has been used in the literature.

4. Semigroup C*-algebras

Nathan Brownlowe (The University of Sydney)

We look at the basic construction of a semigroup C^*-algebra, as well as several classes of examples. We examine some of the properties of semigroups that we see when studying their C^*-algebras.

5. Endomorphisms, subgroups and quotients of totally disconnected locally compact groups

Timothy Bywaters (University of Sydney)

In the early 90's Willis introduced the scale function and tidy subgroups for totally disconnected locally compact groups. These tools have been used to study the general structure of locally compact groups and the theory has recently been generalised from automorphisms to endomorphisms. This better matches our intuition stemming from linear algebra.

In this talk we will outline the properties of the scale of an endomorphism when passing to subgroups and quotients. We will go beyond what has been done for automorphisms by considering cases when the scale decomposes as nicely as possible. We then apply our results by giving insight into an open problem involving topological entropy on locally compact groups.

Joint work with Helge Glöckner and Stephan Tornier.

6. Understanding 3–Manifolds by Their Character Variety

Alex Casella (University of Sydney)

The SL–character variety $X_{SL}(S)$ of a 3–manifold M is one of the many algebraic varieties that carries important topological informations about M. In particular, the ideal points of $X_{SL}(S)$ can detect informative surfaces embedded in M. In this talk, I will start by motivating the topological relevance of embedded codimension 1 manifolds. Then I will define the character variety and show how it is related to embedded surfaces. Finally, I will discuss some recent results on the efficiency of this method. This is a joint work with C. Katerba and S. Tillmann.

7. Congruences on infinite partition monoids

James East (Western Sydney University)

A congruence on a semigroup is an equivalence relation that is compatible with the semigroup operation. Congruences play a role in semigroup theory akin to that of normal subgroups in group theory; they govern the formation of quotient semigroups, are kernels of semigroup homomorphisms, and so on. In a major 1952 paper, A.I. Mal'cev classified the congruences of a full transformation semigroup: i.e., a semigroup consisting of all functions $X \to X$, for some fixed set X. In the finite case, the lattice of all congruences forms a chain. In the infinite case, the situation is far more complicated, but Mal'cev gives a succinct description nevertheless. In this talk, I'll discuss some recent/ongoing work with Nik Ruškuc (St Andrews), in which we classify the congruences of certain infinite diagram monoids: namely, the partition monoids and the partial Brauer monoids.

8. Isomorphism problem for virtually-free groups

Michal Ferov (University of Technology Sydney)

In general, the isomorphism problem for groups is unsolvable, and it is known to be solvable only for few classes of groups such as hyperbolic groups. However, in the case of hyperbolic groups the algorithm is not even primitively recursive. I will discuss a new approach in the case of virtually-free groups which attemtpts to show that there is an effective bound on space complexity. Joint work with Murray Elder (UTS) and Alan Logan (Glasgow).

9. Pleasant actions on $\mathbb{Z}^N$

Sasha Fish (University of Sydney)

We introduce the notion of a *pleasant* action on $\mathbb{Z}^N$, and show how the polynomial walks can be used to exhibit the pleasantness of certain natural actions on $\mathbb{Z}^N$. As a consequence of the pleasantness, we derive new results in twisted recurrence. Based on a joint work with Kamil Bulinski.

10. Radicals and idempotentents

Barry Gardner (University of Tasmania)

If R is a (Kurosh-Amitsur) radical class of rings then for every ring A the R-radical $R(A)$ contains all ideals of A which are in R. In some cases, e.g. when R is the Jacobson radical class, $R(A)$ contains all left ideals which are in R. Radical classes with this property are called left strong, and have been well studied, as have the strict radical classes for which $R(A)$ always contains all subrings which are in R. This talk deals with radical classes which behave analogously for another kind of subrings: corners, where a corner of a ring A is a subring eAe where e is an idempotent in A. This is joint work with Elena Cojuhari.

11. Parabolic subgroups of Artin–Tits groups of spherical type

Volker Gebhardt (Western Sydney University)

In this talk, I will present recent joint work with María Cumplido, Juan González-Meneses and Bert Wiest:

Given an Artin–Tits group of spherical type, we show that the intersection of two parabolic subgroups is a parabolic subgroup, and that the set of parabolic subgroups forms a lattice with respect to inclusion. This extends to all Artin–Tits groups of spherical type a result that was previously known for braid groups.

To obtain the above results, we show that every element in an Artin–Tits group of spherical type admits a unique minimal parabolic subgroup containing it, and that the subgroup associated to an element α in this way coincides with the subgroup associated to any of power or root of α.

The proofs put to good use some machinery for Garside groups that has been developed over the last decade.

12. Permutations sorted by a finite and an infinite stack in series

Yoong Kuan Goh (University of Technology Sydney)

The interest in pattern avoiding permutations is inspired by Donald Knuth's work in stack-sorting. According to Knuth, a permutation can be sorted by passing it through a single infinite stack if and only if it avoids a subpermutation having the pattern 231. Murphy extended Knuth's research by using two infinite stacks in series and found out that the basis for generated permutations is infinite. Elder proved that the basis is finite when one of the stack is limited to depth two. My research is to investigate the permutations generated by a stack of depth 3 or more and an infinite stack in series and to determine the breakpoint at which the basis go from finite to infinite.

13. A restricted Priestley duality on bounded distributive lattices with order-inverting operation

Eli Hazel (LaTrobe University)

The setting was inspired by negation occurring in natural languages and comes from considering a logic of a minimal negation on top of classical disjunction and conjunction. Translating into an algebraic setting (in the same way one obtains Boolean algebras from classical logic), we get bounded distributive lattices with negation as an additional order-inverting unary operation. We give a restricted Priestley duality obtained by equipping Priestley spaces with suitable order-preserving maps.

14. Strongly graded rings

Roozbeh Hazrat (Western Sydney University)

We study the structure of graded rings which happen to be strongly graded. Applications given to the case of path algebras.

15. All or nothing take 2

Marcel Jackson (LaTrobe)

2017 saw the likely resolution of a major problem in theoretical computer science: the Dichotomy Conjecture of Feder and Vardi. Two independent proofs (by Andrei Bulatov and by Dmitri Zhuk) have so far survived close scrutiny. In mathematical terms, this conjecture proposed a dichotomy in the computational complexity of homomorphism problems for finite relational structures: one takes a fixed finite relational structure (such as a graph G) and the input is another similar structure (another finite graph H). Decide if there is a homomorphism from H to G.

Both the Bulatov and Zhuk proofs involve the so-called *algebraic method*, which involves the universal algebraic analysis of "polymorphisms". Polymorphisms are higher dimensional symmetries: they generalize automorphisms in close analogy to how multivariable calculus generalizes one-variable calculus.

This talk concerns a different computational problem that concerns the detection of implied constraints rather than simply existence of solutions. In the graph example, an example implied constraint would be a nonedge in H that, under all homomorphisms into G is preserved as if it were an edge. We show how to mimic aspects of the polymorphism approach to homomorphism problems in this different setting and find that the classification of computational complexity for detection of implied constraints can be reduced to the conventional homomorphism problem complexity for some different structure. A complete classification then follows from the Bulatov/Zhuk result. The work is joint with Libor Barto and Lucy Ham, extending earlier work of Ham and the speaker (All or nothing take 1).

16. Natural dualities for finite semigroups

Tim Koussas (LaTrobe University)

After a brief refresher on the well-known vector space duality, we will consider dualities of the same general form – so-called natural dualities. The general theory of natural dualities encompasses other famous dualities such as Pontryagin duality and Stone duality, but at the same time allows for new dualities to be constructed, with relative ease, from many kinds of algebraic structures.

A basic research problem in this area is to determine which algebras admit a natural duality, in a sense to be made precise. We will look at some examples of finite semigroups that do and do not admit natural dualities, as well as some examples for which the question remains open.

17. On testing isomorphism of finite p-groups of class 2 and exponent p

Yinan Li (University of Technology Sydney)

We consider the algorithmic problem of testing isomorphism of finite p-groups of class 2 and exponent p. We propose to view this problem as a linear algebraic analogue of graph isomorphism. This allows us to transfer ideas and techniques developed for graph isomorphism to this hard instance of group isomorphism. Our main result is an average-case algorithm for this problem that runs in time polynomial in the group order. The average-case analysis is done in a random model which is a linear algebraic analogue of the Erdös-Renyi model for random graphs.

18. Graded Steinberg algebras and partial actions

Huanhuan Li (Western Sydney University)

Given a graded ample Hausdorff groupoid, we realise its graded Steinberg algebra as a partial skew inverse semigroup ring. We use this to show that for a partial action of a discrete group on a locally compact Hausdorff topological space, the Steinberg algebra of the associated groupoid is graded isomorphic to the corresponding partial skew group ring.

This is joint work with Roozbeh Hazrat.

19. Bases for Kumjian-Pask algebras

Raimund Preusser (University of Brasilia)

Kumjian-Pask algebras have been introduced by G. Aranda Pino, J. Clark, A. an Huef and I. Raeburn in 2013. They are defined over higher-rank graphs and generalize the Leavitt path algebras. This talk will be about the problem of finding bases for Kumjian-Pask algebras.

20. On the non-commutative rank of a symbolic matrix

Youming Qiao (University of Technology Sydney)

I will describe an algorithmic problem that arises from non-commutative algebra, invariant theory, and computational complexity. It is the problem of computing the so-called non-commutative rank of a symbolic matrix, which is a matrix with entries being linear forms. This problem was first proposed by P. M. Cohn in 1970's, and was recently shown to be in polynomial time in 2015, by two groups of researchers using very different methods. I will introduce the problem, its background, the ideas behind the recent developments, and an invariant-theoretic problem that was solved along the way.

21. Gradings of C*-algebras

Iain Raeburn (Victoria University of Wellington)

The Leavitt path algebras of directed graphs are graded. The C*-algebraic graph algebras are not graded in the algebraic sense, which raises the issue of what analogous properties they might have. We discuss several notions of grading for C*-algebras.

22. Separability and commensurated subgroups

Colin Reid (University of Newcastle)

A subgroup H of a group G is commensurated if for every $g \in G$, the index $|H : H \cap gHg^{-1}|$ is finite. Examples include normal subgroups, and more generally, virtually normal subgroups, that is, subgroups H such that G normalizes a finite index subgroup of H. I will give a sufficient condition for a commensurated subgroup to be virtually normal and explain some consequences relating to separability and residual finiteness in finitely generated groups. This is joint work with Pierre-Emmanuel Caprace, Peter Kropholler and Phillip Wesolek.

23. Skeleton Groups in Coclass Graphs

Subhrajyoti Saha (Monash Univeristy)

A prominent theme in group theory is the classification of groups. Classification of finite p-groups is a long researched problem in group theory. But finite p-groups have a very intricate structure and the sheer number of groups of a fixed prime-power order p^n makes the classification of finite p-groups by order very difficult. An alternative invariant is introduced in 1980 which is called coclass. The main tool for classification of p-groups by coclass is the coclass graph. It is a deep result that these graphs can be partitioned into a finite subgraph, and finitely many infinite trees, so-called coclass trees. The main aim of coclass theory in the last decade is to understand these trees in a more detail, specially an important class of groups in these trees, which is called the constructible groups. But the definition of constructible group is much technical. Motivated by the works done for prime 3 and coclass 2, we define a less technical equivalent of constructible groups which are called skeleton groups. We study these groups by investigating their isomorphism problem and apply our results in some special case.

24. Reconstruction of groupoids from pairs of algebras

Aidan Sims (University of Wollongong)

A groupoid is a group with an identity crisis: a set with a partially defined associative multiplication in which every element has an inverse. Operator algebraists have been interested in operator algebras associated to groupoids since the 60's because they allow us to construct lots of interesting and tractable examples. In particular, groupoid models were fundamental to Kumjian, Pask, Raeburn and Renault's development of graph C^*-algebras in the late 90's, even though these are typically described using generators and relations. Algebraists became interested in graph C^*-algebras when they recognised the relations that define Leavitt algebras in some of the key examples, and developed the Leavitt path algebras as an algebraic analogue. They quickly discovered that theorems from either area often had direct analogues in the other, even though completely different techniques were usually needed to prove them. This led Abrams to ask whether there is a "Rosetta Stone to translate results back and forth between the two areas". I will discuss work with Clark, Farthing and Tomforde on associating algebras to groupoids, and subsequent work with Ara, Bosa and Hazrat that shows that the groupoid can often be reconstructed from its algebra together with a natural maximal abelian subalgebra. Combined with analogous results of Renault for C^*-algebras, these results provide a very satisfactory answer to Abrams' question.

25. Lattices of subgraphs

Chris Taylor (LaTrobe University)

The lattice of subgraphs of a graph forms an algebraic structure known as a regular double p-algebra. More generally, the lattice of point-preserving substructures of an incidence structure forms a regular double p-algebra, and this essentially characterises them.

After giving a recap of the characterisation, we will show how this can be used to translate a particular open problem in graph theory into a different question in lattice theory.

26. Base radical and semisimple class operators for finite associative rings

Lauren Thornton (University of the Sunshine Coast)

Class operators are used to give a complete listing of possible radical and semisimple classes for universal classes of finite associative rings. General relations between operators reveal the maximum order of the semigroup they form is 46. In this setting, hereditary radical classes are semisimple and strongly semisimple classes are radical-semisimple.

27. Self-similar groupoid actions.

Mike Whittaker (University of Glasgow)

A self-similar groupoid action (G,E) consists of a faithful action of a groupoid G on the path space of a graph which displays a notion of self-similarity. In this talk I will explain this concept and give some examples. This talk is based on joint work with Marcelo Laca, Iain Raeburn, and Jacqui Ramagge.

28. Graphical regular representations of groups of prescribed valency

Binzhou Xia (University of Melbourne)

The problem of whether a group can be represented as the automorphism group of a graph was considered at a very early stage of graph theory. If a group G is isomorphic to the automorphism group of a Cayley graph Γ of G, then Γ is said to be a graphical regular representation (GRR) of G. In this talk I will discuss GRRs of prescribed valency, especially those of finite simple groups.

29. Characterisations of Extended Tutte Invariants

Kai Siong Yow (Monash University)

An *alternating dimap* is an orientably embedded Eulerian directed graph where the edges incident with each vertex are directed inwards and outwards alternately. Three reduction operations for alternating dimaps were investigated by Farr (2011). A *minor* of an alternating dimap can be obtained by reducing some of its edges using the reduction operations. Unlike classical minor operations, these reduction operations do not commute in general.

A *Tutte invariant* for alternating dimaps is a function F defined on every alternating dimap and taking values in a field $\mathbb{F}$ such that F is invariant under isomorphism and obeys a linear recurrence relation involving reduction operations. It is well known that if a graph G is planar, then $T(G; x, y) = T(G^*; y, x)$. We prove an analogous relation for an extended Tutte invariant for alternating dimaps. We then characterise the extended Tutte invariant under several conditions. As a result of the non-commutativity of the reduction operations, the Tutte invariants are not always well defined. We investigate the properties of alternating dimaps that are required in order to obtain a well defined Tutte invariant. Some excluded minor characterisations for alternating dimaps are also given.

timetable

Monday			
Start	End	11.00.401	11.00.405
9:00	9:30	Registration	
9:30	9:40	Welcome	
9:40	10:20	Muchtadi-Alamsyah	
10:30	10:50	Fish	
10:55	11:30	Morning Tea	
11:30	11:50		Qiao
12:00	12:20		Y. Li
12:25	2:10	Lunch	
2:10	2:30	Thornton	Alspach
2:40	3:00		Bywaters
3:10	3:30	Taylor	Reid
3:35	4:00	Afternoon Tea	
4:00	4:20	Saha	Casella
4:30	4:50	Kousass	Ferov
5:00	5:20	Goh	Xia

Tuesday		
Start	End	11.00.405
10:10	10:50	An Huef
11:00	11:30	Morning Tea
11:30	11:50	Armstrong
12:00	12:20	Raeburn
12:30	12:50	Brownlowe
12:55	2:10	Lunch
2:10	2:30	Sims
2:40	3:00	H. Li
3:10	3:30	Whittaker
3:35	4:00	Afternoon Tea
4:00	4:20	Gebhardt
4:30	4:50	Bishop
5:00	5:20	Yow
7:30	10:00	Dinner

Wednesday			
Start	End	11.00.405	04.05.430
10:00	10:40	Bak	
10:50	11:30		
11:30	11:50	Preusser	Gardner
12:00	12:20	Hazrat	Jackson
12:30	12:50	East	Hazel
12:55			Lunch (provided)

map

AAC01 Local info

The conference

1 UTS Building 11

2 UTS Building 4 (Wednesday parallel talks)

3 Bodhi Restaurant (Dinner venue Tuesday 7:30pm)

Food and coffee

1 Seoul Orizin

2 Pho Naman

3 Chinatown Noodle Restaurant 北方拉面馆

4 Takara

5 Erashai

6 The Caffeine Project

7 Something for Jess

8 Toby's Estate Coffee Roasters